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Evolved Developmental Niche Provision Report: Moral Socialization, Social Thriving, and Social Maladaptation in Three Countries

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Abstract

Evolutionary systems theory identifies niches as key developmental inheritances for animals. The human evolved developmental niche (EDN) is characterized by positive touch, responsiveness, play, and social togetherness and provides the responsive, relational dynamism that optimizes development. Cross-sectional and longitudinal studies of the human EDN have demonstrated correlations between degree of EDN consistency in early childhood and positive sociomoral development and avoidance of ill-being and misbehavior. We created a brief report of children's recent EDN experience and examined its relation to child well-being and sociomoral development. Using samples from three cultures (United States, *N*=574; Switzerland, *N*=96; China, *N*=382), EDN provision in the past week was related to multiple child outcomes even after controlling for parental age, education, income, responsivity, and child gender. Factor analyses indicated three sets of latent factors in each sample: Moral Socialization, Social Maladaptation, and Social Thriving. Structural equation models indicated that EDN provision significantly predicted Social Thriving in all samples beyond control variables. EDN provision may be particularly helpful in predicting optimal social development.

Keywords

evolved developmental niche, sociality, Moral Socialization, China, Switzerland, preschool, parenting, Social Maladaptation, moral development, well-being

Young children's development is an ongoing, interactive process that occurs in the context of relationships. Mothers and others provide an environment that fosters development of children's rapidly changing systems (Keating, 2016). Theories of development that emphasize dynamism suggest that the experiences a child has early in life have significant long-term effects. For example, relational developmental systems meta-theory considers change, process, and relationships as fundamental categories of development and self-organization (Overton & Molenaar, 2015). Similarly, evolutionary systems theory (Oyama, Griffiths, & Gray, 2001) identifies multiple extra-genetic inheritances that form part of human evolutionary adaptation, such as culture and self-organization, and also the particular developmental system, niche, or nest for the young that optimizes normal development, which all animals evolved to provide their young (Gottlieb, 2002). The characteristics of the human evolved developmental niche (EDN) are commonly represented in nomadic foraging communities worldwide, the type of society that represents 95% of human history (Hewlett & Lamb, 2005), and comprise what was first called the "hunter-gatherer childhood model," an intensified set of practices based on the social mammalian niche that emerged over 30 million years ago (Konner, 2005). The human EDN includes responsiveness to young children's needs, extensive positive touch, lengthy on-request breastfeeding, self-directed social play in nature, multiple responsive adult caregivers, and a positive climate of support. Thus,

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strong theoretical foundations in ethology exist for the presence of developmental niches, but regardless of the origin, this study considers features of the purported evolved niche for young human beings. We developed a brief measure to examine the EDN and its relation to child well-being and sociomoral development.

Narvaez and colleagues have been gathering information about the EDN and find that in industrialized societies where empirical studies are usually conducted, each EDN component has been related to the development of health and well-being (for EDN component reviews, see Narvaez, Panksepp, Schore, & Gleason, 2013a). For example, affectionate touch moderates an infant's stress response (Feldman, Singer, & Zagoory, 2010) and increases oxytocin release which is associated with social affiliation (Feldman, 2012). In a longitudinal study of at-risk families, measures of positive touch in the first year related positively to social engagement at 18 months and negatively to externalizing behaviors at ages 2 and 3; breastfeeding was linked to reduced aggression and depression at age 2—even when controlling for maternal education and income (Narvaez, Gleason, et al., 2013). Such findings support the idea that conformity to at least some aspects of the human EDN early in life is connected to later healthy psychological outcomes. Using a survey of the EDN components with a large sample (N=626) of American mothers of 3-year-olds, responsive parenting, free play with mother, closeness with caregivers, and affectionate touch were significantly related to multiple child outcomes, such as empathy, self-regulation, and concern after wrongdoing (Narvaez, Gleason, Lefever, Wang, & Cheng, 2016). A similar but broader array of relationships among the EDN components and child outcomes was found when replicated with a sample of Chinese mothers (N=383; Narvaez, Wang, et al., 2013). For example, in China, breastfeeding length was related to child empathy, inhibitory control, and concern after wrongdoing. Play with adults other than parents was related to these same outcomes in the Chinese sample but not in the American sample. In a related unpublished pilot study with a smaller sample of American mothers (N=55), observed maternal responsiveness was linked to 3-year-old children's cognitive development, ability to identify emotions, and inhibitory control. These studies provide support for the impact of EDN-consistent caregiving on child development as well as similarities and differences between cultures.

The relations that have emerged between EDN components and sociomoral outcomes, such as empathy and concern after wrongdoing, raise the question of the mechanisms—for example, what processes are responsible for the relation between affectionate touch and empathy? Theoretically, EDN-consistent caregiving facilitates the development of physiological and psychological systems that are foundational for sociomoral functioning (e.g., affectionate touch shapes the oxytocin system and adaptive vagus nerve activity while reducing cortisol release which decreases social anxiety and increases openness in social interactions; Field, 2010). According to triune ethics metatheory (TEM; Narvaez, 2014, 2016), three basic orientations that have their foundations in physiological and psychological development undergird sociomoral behavior. When an orientation guides behavior, trumping other values, it represents an ethic. First, self-protectionism emerges from a routinely activated stress response, leading to a self-guarding orientation in social situations. A self-protectionist ethic is facilitated by threat perception and is driven by primitive survival systems. Behaviorally, it manifests as social withdrawal or social opposition. Second, an engagement ethic involves face-to-face, flexible relational attunement. Behaviorally, it emerges from and is visible in mutually responsive social cooperation and play. Third, a reflective imagination ethic uses executive functions to facilitate reasoning and imagine prosocial possibilities in social relations. Theoretically, an early life consistent with the EDN fosters habitual use of relational attunement and reflective imagination—capacities associated with sociomoral outcomes such as empathy, self-regulation, and concern after wrongdoing (Kochanska, 2002). In multiple studies with adults, retrospective reports of EDN-*inconsistent* care were related to self-protectionist ethics (Narvaez, Wang, & Cheng, 2016), less prosocial behavior, and greater aggression (Narvaez & Hardy, 2016; Narvaez, Thiel, Kurth, & Renfus, 2016). In contrast, reports of greater EDN-consistent childhood experience were related to engagement and reflective imagination, and both were related to prosocial action. The focus here is on measuring the provision of the EDN in early life where theoretically these contrasting ethical orientations are initiated.

Early life orientations toward relational attunement or self-protection (opposition or withdrawal) reflect moral temperament. We define moral temperament as an individual's tendency to be open toward others or defensive in interactions with others. In prior studies with children, mothers' attitudes toward EDN-consistent caregiving were related to their children's moral temperament. Mothers with positive attitudes toward EDN-consistent parenting behaviors, such as positive touch, play, responsiveness, and the engagement of multiple caregivers, were more likely to have children with a moral temperament of openness or engagement toward others (e.g., social attunement). In contrast, mothers whose attitudes were less EDN-consistent had children who exhibited defensive moral temperament or an orientation toward self-protectionism (e.g., social withdrawal; Gleason, Narvaez, Cheng, Wang, & Brooks, 2016). The study provided support for the idea that parenting *attitudes* toward EDN-consistent care related to children's sociomoral orientations. In the current study, we expanded on this work, specifically wanting to examine connections between parent-reported *child experience* of the EDN and children's moral temperament, as well as other measures of sociomoral development and well-being.

In prior studies of the EDN with child outcomes, mothers were questioned extensively about their general attitudes and behaviors. In this study, we sought to develop a way to measure a child's EDN-consistent experience with only a few questions and more proximally. We developed a measure that could be used quickly and periodically with parents to measure the child's EDN-consistent experience over time. Based on success with a 11-item adult measure of EDN history that correlated with mental health, moral capacities, and moral orientation (Narvaez, Wang, & Cheng, 2016), we developed a proximal measure to be used by parents about a child's recent EDN experience, as a presumed snapshot of experience over the long term. We wanted to see whether a short measure of EDN-consistent experience could also capture relations between reported childhood experience and child outcomes, as did research with the longer measures described earlier. Our goal here was to validate the scores and the use of the scores to make predictions in three countries. Theoretically, we expected that scores on the new measure of EDN-consistent experience would be related to positive child outcomes. We also expected that parents who reported their children's recent experience as EDN-consistent would have children with higher scores on measures of psychological well-being (using measures of well-being, happiness), sociomoral development (socialization measures of self-regulation, empathy, conscience), and Social Thriving (social enjoyment, attunement, consideration, imagination). If we found significant relationships between scores on the new measure and positive child outcomes, it would demonstrate the construct validity of the measure. Furthermore, we decided to take advantage of our data to explore their relation to negative outcomes. Although literature explores the relationship between parental responsiveness and child outcomes, even mitigating negative child outcomes (e.g., Sroufe, Egeland, Carlson, & Collins, 2005), little work addresses how a measure of the EDN might be related to negative child outcomes, above and beyond responsive care. We thought that perhaps those with EDN-inconsistent experience would be more likely to show psychopathology and self-protective behaviors in social situations. Thus, we also explored the relation between the EDN and negative child outcomes. In both cases—positive and negative outcomes—we controlled for parent responsivity to find out whether our short measure would provide predictive validity beyond parent responsivity.

Study 1

Method

Participants and procedure. Participants were recruited from online parenting blogs and regional daycares (574 U.S. parents [508 mothers] with 3- to 5-year-old children; 327 sons, 1 "Other Sex"). Parental age ranged from 20 to 49 years ($M_{mothers}$ = 32.85; $M_{fathers}$ = 32.65). Education levels were distributed across a wide spectrum: Participants completed some high school (1%); high school diploma/General Educational Development (GED; 5.2%); some college, associate's, or technical degree (26.8%); bachelor's degree (37.5%); and master's, professional, or doctorate degree (29.5%). Annual household income ranged from less than US$15,000 (3%), US$15,000 to US$30,000 (12.4%), US$30,000 to US$50,000 (21.8%), US$50,000 to US$75,000 (23.5%), US$75,000 to US$100,000 (19.9%), to more than US$100,000 (19.5%). Participants completed the survey online and received a gift card.

Measures. Measures included reports on provision of the EDN, responsivity, child mental health outcomes, and sociomorality. Internal consistency (Cronbach's α) and reliabilities are provided in Table 1.

Evolved Developmental Niche Provision Report (EDNPR). The EDNPR is a six-item checklist about the child's experience in the last week (6-point scale; 1= *never*; 6 = *several times a day*). It is based on the EDN History for adults (Narvaez, Wang, & Cheng, 2016), which contains 11 items, including questions on breastfeeding and parental responsiveness eliminated here. We used six items appropriate for parents of preschoolers: positive and negative touch, indoor and outdoor free play, and family togetherness inside and outside the home (see supplemental materials for items). Responses were summed to create a composite. Questions represent a checklist of a child's overall environment (which can vary by calendar, season, and life events), rather than a specific aspect, so 16 mothers provided test–retest reliability over a 2-week interval.

Responsivity. For parental responsivity (Narvaez, Wang, et al., 2013), parents rated seven items (e.g., "I feel that my child and I have warm, intimate times together") on a 6-point scale (1 = *strongly disagree* to 6 = *strongly agree*). Responses were averaged.

Child well-being. Two measures assessed child well-being (Gleason et al., 2016). *Thriving* includes nine items (e.g., "My child deals well with problems") scored using a 6-point scale (1 = *never* to 6 = *always*). *Happiness* is a five-item frequency measure (e.g., "Dances spontaneously") scored on a 6-point scale (1 = *never* to 6 = *more than once a day*).

Child ill-being. Three measures assessed ill-being. *Depression* (Gleason et al., 2016) included 10 items on frequency of childhood depression symptoms (e.g., "How often does your child lack confidence?") scored on a 6-point scale (1 = *never* to 6 = *several times a day*). The 14-item *Preschool Anxiety Scale* measured *anxiety* (Spence, Rapee, McDonald, & Ingram, 2001; e.g., "Is afraid of meeting or talking to unfamiliar people")[1] on a 5-point scale (0 = *not true at all* to 4 = *very often true* or *not applicable*). *Misbehavior* (Gleason et al., 2016) was measured with five frequency items (e.g., "How often does your child misbehave?") and was rated on a 5-point scale (1 = *never* to 5 = *several times a day*).

Table 1. Means, Standard Deviations, and Reliability Coefficients for Predictors and Factors by Sample.

	United Sates (n = 451-574)		Switzerland (n = 80-96)		China (n = 365-382)	
Variable	*M* (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α
EDNPR[a]	29.48 (3.43)	.72[b]	23.84 (9.37)	.64[b]	14.50 (4.51)	.75[b]
Responsivity	4.43 (0.53)	.70	4.51 (0.41)	.78	3.03 (0.38)	.83
Moral Socialization variables						
Internalized conduct	4.32 (1.09)	.86	3.06 (0.75)	.84	4.13 (0.52)	.61
Inhibitory control	4.97 (0.85)	.83	—	—	4.75 (0.79)	.81
Concern after wrongdoing	5.16 (1.18)	.88	3.46 (0.64)	.70	5.21 (0.94)	.82
Empathy	5.31 (0.60)	.86	4.09 (0.54)	.82	5.04 (0.68)	.74
Social Maladaptation variables						
Depression	1.99 (0.68)	.92	2.11 (0.75)	.83	1.70 (0.65)	.86
Anxiety	1.46 (0.51)	.94	1.56 (0.44)	.81	2.32 (0.91)	.91
Misbehavior	2.69 (0.47)	.75	2.08 (0.80)	.67	2.24 (0.45)	.81
Social opposition	2.63 (0.98)	.92	2.27 (0.85)	.88	1.98 (0.77)	.89
Social distrust	3.08 (0.82)	.42[c]	1.84 (0.88)	.70[c]	1.81 (0.79)	.76[c]
Social withdrawal	2.43 (0.80)	.91	2.22 (0.80)	.87	2.15 (0.73)	.90
Social Thriving variables						
Thriving	5.43 (0.51)	.91	5.03 (0.54)	.78	4.75 (0.78)	.81
Happiness	5.35 (0.63)	.72	4.21 (0.79)	.74	4.50 (1.18)	.62
Social attunement	5.16 (0.72)	.88	4.18 (0.97)	.88	3.88 (1.17)	.94
Social enjoyment	5.61 (0.58)	.93	5.09 (0.70)	.89	4.67 (1.15)	.97
Social consideration	5.00 (0.77)	.84	3.99 (0.82)	.71	3.64 (1.12)	.91
Social imagination	4.97 (0.84)	.81	4.46 (0.83)	.78	3.87 (1.17)	.94

Note. All reliability coefficients are Cronbach's alpha, unless otherwise noted. EDNPR = Evolved Developmental Niche Provision Report.
[a]Composite score of EDNPR.
[b]Indicates test–retest reliability.
[c]Two-item measure, indicates bivariate correlation.

Child Moral Socialization. Moral Socialization was measured using 7-point Likert-type scales (1 = *extremely untrue of your child* to 7 = *extremely true of your child*). Because self-control is part of successful moral behavior, we measured self-regulation through (a) *internalized conduct* (nine items; Kochanska, 1994; e.g., "When unsupervised, is likely to stop himself or herself on his or her own when just about to do something wrong"); (b) *inhibitory control*, using the Child Behavior Questionnaire subscale (CBQ; 13 items; Rothbart, Ahadi, Hershey, & Fisher, 2001; e.g., "Is good at following instructions"); and (c) *concern after wrongdoing* (eight items; Kochanska, 1994; e.g., "After having done something naughty, asks to be forgiven"). We also measured *empathy* (Kochanska, 1994; 13 items; e.g., "Will try to comfort or reassure another in distress").

Child moral temperament. The Child Triune Ethics Measure (CTEM; Gleason et al., 2016) is a parent report of child moral temperament using a 6-point Likert-type scale (1 = *never* to 6 = *several times a day*). Its 53 items comprise seven subscales related to sociomoral capacities (Narvaez, 2016). Three are associated with social self-protectionism: *opposition, distrust*, and *withdrawal*. Three are associated with social engagement: *attunement, enjoyment*, and *consideration* and one with imagination: *social imagination*.

Analyses. A set of exploratory and confirmatory factor analyses identified three latent child outcome variables. We then tested the relationship between EDNPR and the three factors using structural equation modeling (SEM; Figures 1-3). All models were analyzed using the lavaan package (Rosseel, 2012) in R (R Core Team, 2016). We utilized robust standard error estimates, Yuan–Bentler corrections for model fit indices, and full-information maximum likelihood estimation to deal with missing data (Yuan & Bentler, 2000). Furthermore, we examined model fit based on three standard criteria: robust chi-square, comparative fit index (CFI), and bias-corrected 90% confidence interval (CI) of root mean square error of approximation (RMSEA) (Hooper, Coughlan, & Mullen, 2008).

Results

Means and standard deviations are provided in the first column of Table 1 (see supplemental materials for correlations). Previous work using data from 166 mothers of 3-year-old

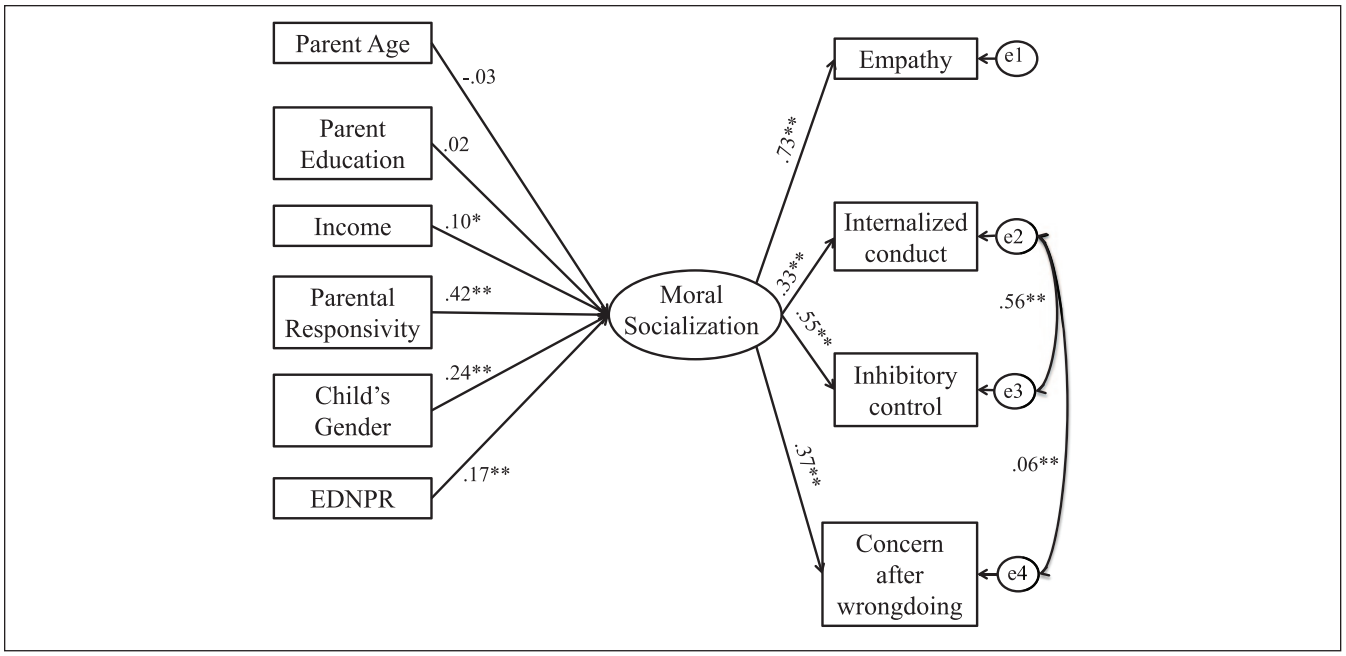

Figure 1. U.S. Moral Socialization predicted by EDNPR and covariates.
Note. Standardized solutions. Robust $\chi^2(23) = 28.92$, $p = .18$; CFI = .99; RMSEA = .033, 90% CI RMSEA = [.00, .04]. EDNPR = Evolved Developmental Niche Provision Report; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval.
*$p < .05$. **$p < .01$.

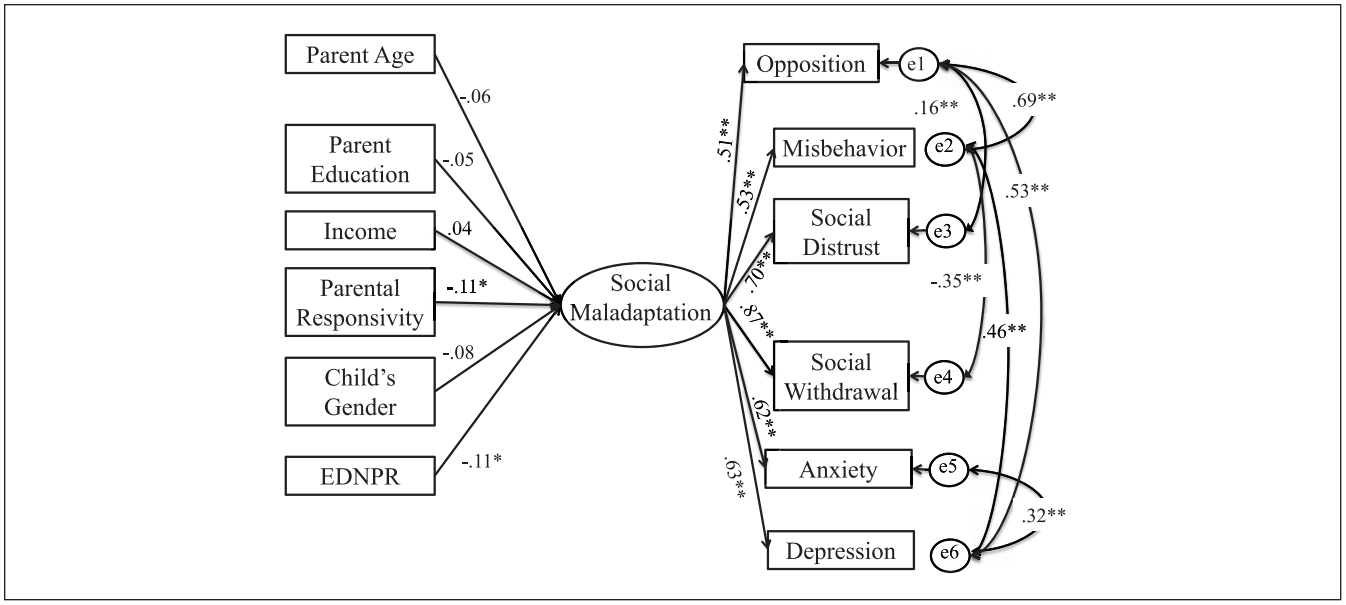

Figure 2. U.S. Social Maladaptation predicted by EDNPR and covariates.
Note. Standardized solutions. Robust $\chi^2(38) = 87.44$, $p < .001$; CFI = .94; RMSEA = .05, 90% CI RMSEA = [.04, .06]. EDNPR = Evolved Developmental Niche Provision Report; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval.
*$p < .05$. **$p < .01$.

children (Narvaez, Gleason, et al., 2016) suggested that the child outcomes loaded on three factors. For this study, both parallel and exploratory factor analyses suggested three factors should be retained. Kaiser's rule also pointed to retaining three factors, with three eigenvalues larger than 1. Therefore, three measurement models were created. First, Moral Socialization was a combination of internalized conduct, inhibitory control, concern after wrongdoing, and

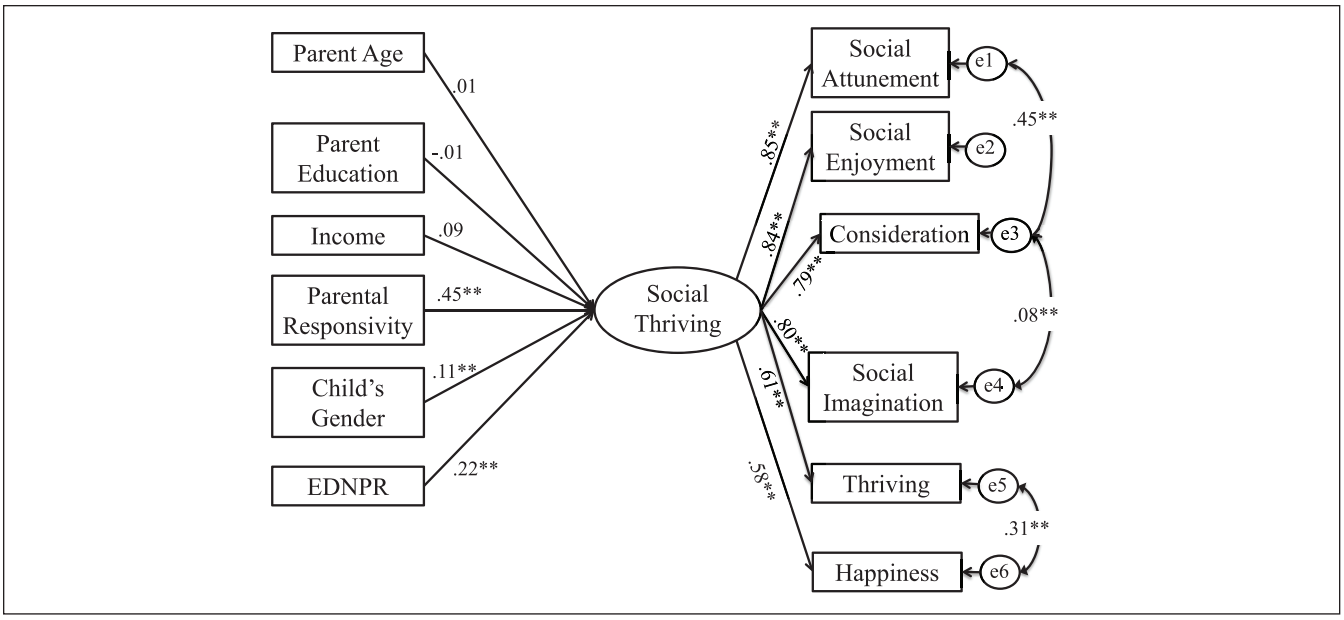

Figure 3. U.S. Social Thriving predicted by EDNPR and covariates.
Note. Standardized solutions. Robust $\chi^2(44) = 88.79$, $p < .001$; CFI = .98; RMSEA = .05, 90% CI RMSEA = [.04, .06]. EDNPR = Evolved Developmental Niche Provision Report; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval.
*$p < .05$. **$p < .01$.

empathy (see latent outcome in Figure 1). Within the measurement model, we allowed for the residual covariances between internalized conduct, concern after wrongdoing, and inhibitory control, which created a saturated model. We allowed these residuals to covary based on model modification indices. The same set of residual covariances was applied to Study 2 and Study 3 and were cross-validated (see Study 2 and Study 3 results).

We also explored the relation between EDN-consistent experience and negative outcomes. Social opposition, distrust, and withdrawal, along with anxiety, depression, and misbehavior, loaded on Social Maladaptation (see latent outcome in Figure 2). This model allowed for several residual covariances: social opposition with misbehavior, depression, and distrust; depression with anxiety and misbehavior; and misbehavior with withdrawal. Model fit was adequate: robust $\chi^2(3) = 2.53$, $p = .47$; CFI = 1.00; and 90% CI RMSEA = [.000, .070].

Social Thriving included social attunement, social enjoyment, and social imagination, as well as consideration, thriving, and happiness (see latent outcome in Figure 3). A set of residuals was allowed to be covaried based on model modification indices: well-being with happiness and consideration with imagination and attunement. This model was adequate: robust $\chi^2(6) = 3.45$, $p = .75$; CFI = 1.00; and 90% CI RMSEA = [.000, .037].

Next, SEM models were fitted to test whether EDNPR predicted each outcome while controlling for demographic information. We used the latent child outcome measurement model coefficients as constraints in SEM analyses. Both SEM models fit the data well (see Figures 1-3). As expected, EDNPR positively predicted Moral Socialization ($b = 0.17$, $p = .005$) and Social Thriving ($b = 0.22$, $p < .000$). Both models controlled for parents' age, education, income, responsivity, and child's gender. Using the same controls, we found that EDNPR also negatively predicted Social Maladaptation ($b = –0.11$, $p = .02$).

Discussion

The EDNPR scores have good test–retest reliability and predicted the positive child outcomes as expected. As hypothesized, the EDNPR measure predicted both of the factors that emerged from the child outcome data: Moral Socialization and Social Thriving. Moral Socialization aligns with moral development as previously studied longitudinally by Kochanska (2002). We expected the relation between our brief measure of the EDNPR and Moral Socialization because of the theoretical connection between EDN-consistent care and healthy physiological systems that facilitate good self- and emotion regulation (Narvaez, Panksepp, Schore, & Gleason, 2013b). Social Thriving comprises outcomes of engaged social life (e.g., social attunement, thriving). The positive relation between EDNPR and Social Thriving is consistent with views of moral development that relate it to enjoyment of connections with others. Specifically, Social Thriving includes social enjoyment, a component of what Darwin (1871/1981) identified as humanity's evolved moral sense.

Social Maladaptation includes negative outcomes that represent externalizing and internalizing tendencies that

overlap with protectionism in moral temperament. Scores on the EDNPR were negatively related to maladaptation, even when controlling for the effects of parental responsivity and demographics. These results are consistent with work demonstrating relationships between negative attitudes toward EDN-consistent care and negative child outcomes (Gleason et al., 2016).

All latent factors were predicted by EDNPR even after multiple controls. Interestingly, apart from the consistent power of parental responsivity, the significance of controls varied for each model. Gender was also predictive for Social Thriving and Moral Socialization. In both models, the outcome scores were higher for girls than boys. One interpretation of these findings is that girls tend to mature more quickly and be more resilient to stressors than boys (Schore, 2017), and perhaps as a result, their scores on the Moral Socialization and Social Thriving measures were higher. The fact that income was a significant predictor of Moral Socialization corresponds with research connecting socioeconomic status (SES) and socioemotional development (Bradley & Corwyn, 2002), suggesting differences in socialization or a poverty deficit (more toxic stress) might influence factors of self-control, conscience, and empathy. Finally, for Social Maladaptation, only responsivity was predictive along with EDNPR, suggesting that EDNPR may be useful for predicting negative outcomes.

The new measure worked well with a U.S. sample, but would it work with a sample from a different country? Although we expected EDN-consistent behavior to influence sociomoral development regardless of the culture because the basis of these behaviors is purported to be in human evolution, norms for behaviors such as touch, play, and togetherness might differ cross-culturally. To investigate these questions, we collected the same variables in Switzerland.

Study 2

Method

Participants and procedures. Participants were recruited from children's hospitals, pediatricians' practices, daycares, and family counseling centers in Switzerland. Institutions distributed flyers describing the study that contained a link to the online survey. In addition, a call for participants was published on the Facebook page of one of the universities hosting the study. Eighty-four Swiss mothers and 12 Swiss fathers of 3- to 5-year-old children participated (52 sons). Parental age ranged from 28 to 66 years ($M_{\text{mothers}} = 36.3$; $M_{\text{fathers}} = 41.2$). Education levels were distributed across a wide spectrum: finished compulsory school (2.1%), high school diploma or apprenticeship (26%), teacher education seminary (5.2%), applied science or bachelor's degree (33.3%), and master's or doctorate degree (33.4%). Annual household income ranged from below the Swiss average of CHF 85,344 or US$86,363 (16.7%), equal to the Swiss average (19.8%), to higher than the Swiss average (62.5%), and one declined a response. Participants received an online gift card for participating.

Measures. The measures used in Study 1 were used in Study 2; however, inhibitory control was removed from analyses due to items that were culturally foreign (e.g., reference to unfamiliar games) and due to severe missing data. The test–retest reliability of EDNPR was assessed based on the data of 15 mothers and two fathers over a 2-week interval ($r = .64$). Materials were translated into German by native speakers on the research team and underwent discursive validation in a pretest involving six parents (two fathers).

Results

Means, standard deviations, and reliability coefficients are listed in Table 1 (see supplemental materials for correlations). We again fitted SEM models to examine the same three measurement models of the outcomes variables, and then the relationship between EDNPR and the outcomes (see Figures 4-6). The Moral Socialization measurement model was saturated; however, as noted above, inhibitory control was not included. Social Thriving had the same factorial structure with similarly adequate fit indices as U.S. Social Thriving, robust $\chi^2(6) = 2.62$, $p = .85$, CFI = 1.00, 90% CI RMSEA = [.000, .085]. Finally, the Social Maladaptation measure model fit the Swiss data well, robust $\chi^2(3) = .408$, $p = .94$, CFI = 1.00, 90% RMSEA = [.001, .0001]. We therefore assumed cross-cultural configural measurement invariance for the child outcome variables as shown in the same latent structures of the outcomes between countries.

Following the creation of the Swiss measurement models, we tested the relationship between EDNPR and the three outcomes using SEM models. All models controlled for mother's age, education, income, responsivity, and child's gender. All models fit the data well (see Figures 4-6).

EDNPR significantly positively predicted Social Thriving ($b = 0.51$, $p < .001$), but did not predict Moral Socialization ($b = 0.20$, $p = .11$) or Social Maladaptation ($b = 0.01$, $p = .99$).

Discussion

The role of the EDNPR in predicting the two predicted sets of child outcomes was notably different in the Swiss sample than in the U.S. sample and also for Social Maladaptation. EDN-consistent care appeared to be a good predictor of Social Thriving but had no bearing on Moral Socialization or Social Maladaptation. In the Swiss sample, other variables had more relevance for predicting child outcomes: Low parental responsivity was a significant predictor of Social Maladaptation; older mothers tended to report greater Social Maladaptation and lower Moral Socialization among their children than did younger mothers, suggesting that

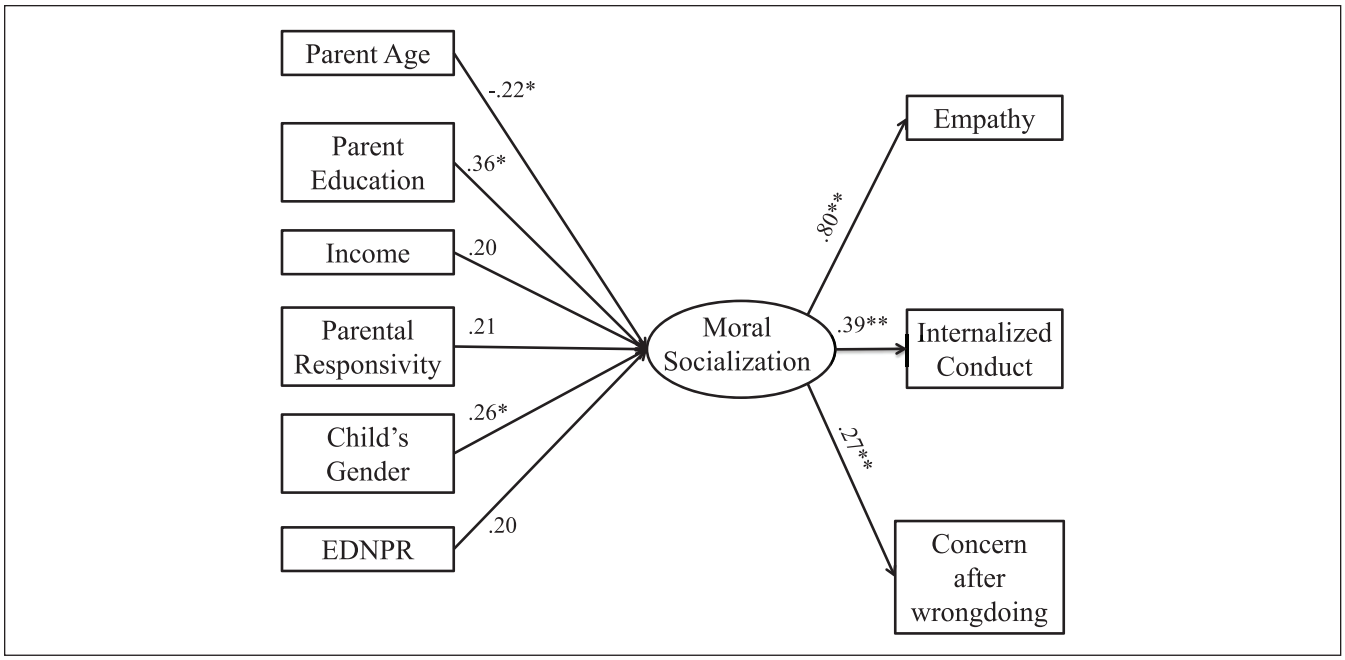

Figure 4. Swiss Moral Socialization predicted by EDNPR and covariates.
Note. Standardized solutions. Robust $\chi^2(14) = 13.99$, $p = .45$; CFI = 1.00; RMSEA = .00, 90% CI RMSEA = [.00, .10]. EDNPR = Evolved Developmental Niche Provision Report; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval.
*$p < .05$. **$p < .01$.

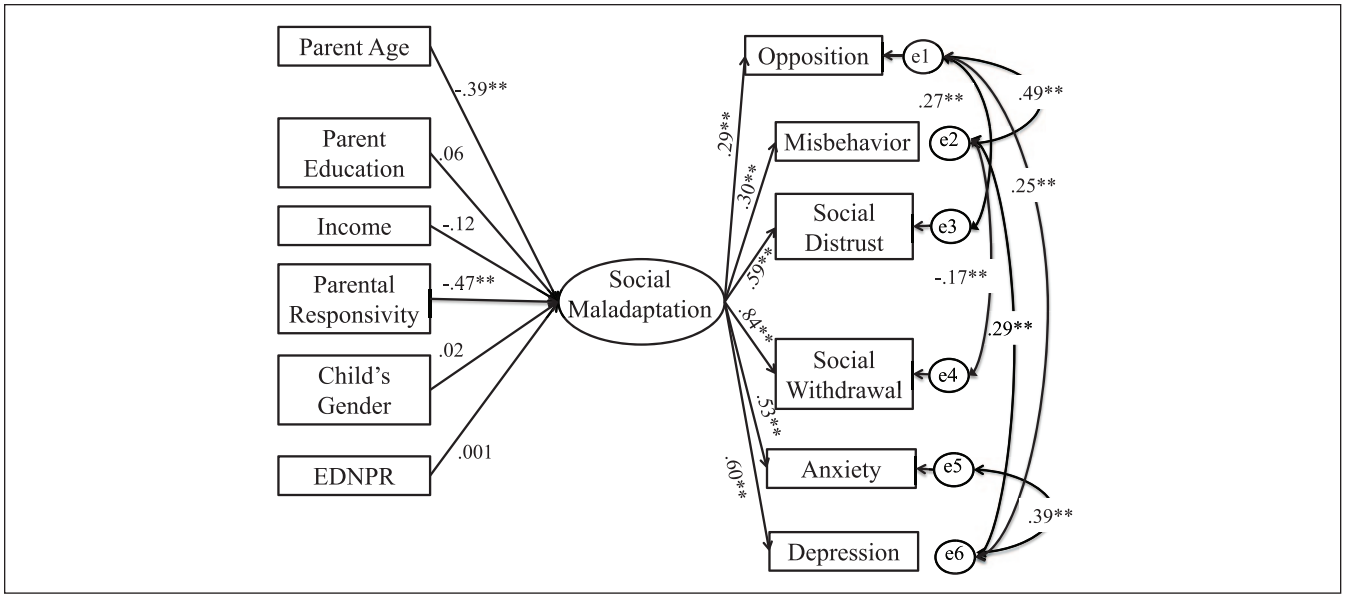

Figure 5. Swiss Social Maladaptation predicted by EDNPR and covariates.
Note. Standardized solutions. Robust $\chi^2(44) = 38.51$, $p = .71$; CFI = 1.00; RMSEA = .00, 90% CI RMSEA = [.00, .05]. EDNPR = Evolved Developmental Niche Provision Report; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval.
*$p < .05$. **$p < .01$.

investigating parenting differences between the children of older and younger mothers—or the perspectives of these mothers themselves—might illuminate processes or mechanisms in children's sociomoral development.

Moral Socialization was also predicted by gender of child (mothers reported higher Moral Socialization for girls than boys), which is consistent with prior findings attributing more attention to and concern with the feelings of others

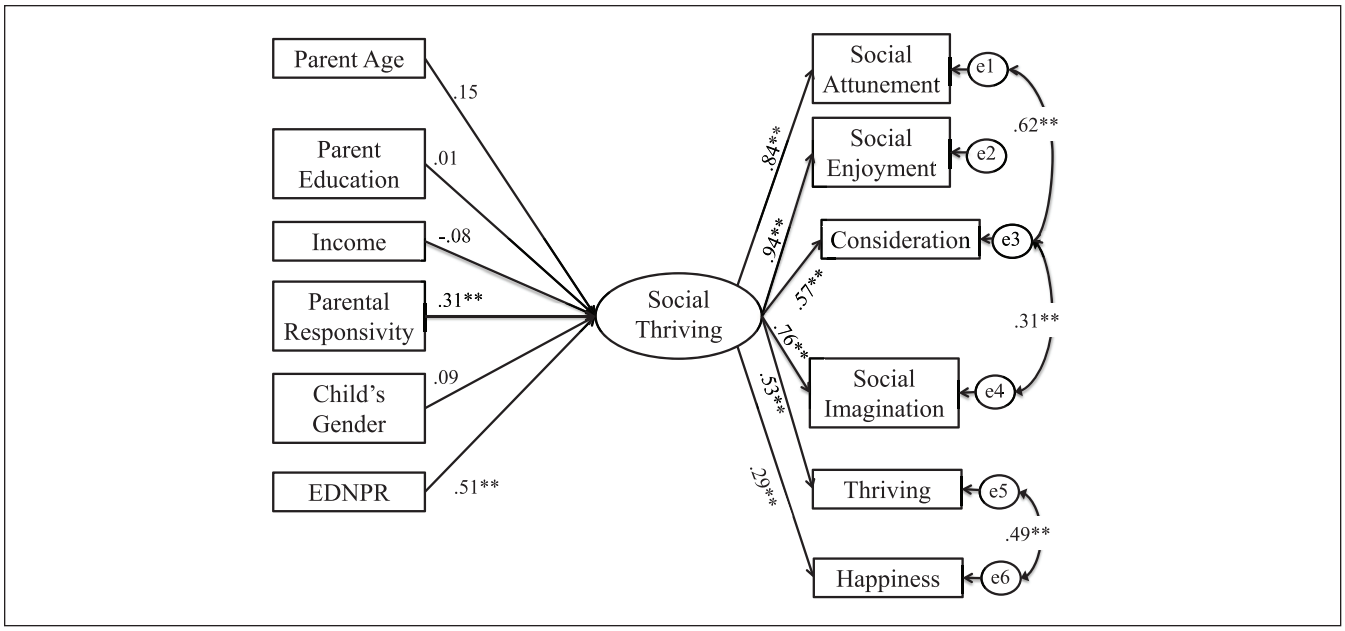

Figure 6. Swiss Social Thriving predicted by EDNPR and covariates.
Note. Standardized solutions. Robust $\chi^2(44) = 44.89$, $p = .43$; CFI = 1.00; RMSEA = .01, 90% CI RMSEA = [.00, .07]. EDNPR = Evolved Developmental Niche Provision Report; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval.
*$p < .05$. **$p < .01$.

among girls than boys. The other behaviors associated with EDN-consistent caregiving (e.g., positive and negative touch, family togetherness) did not contribute to variables dependent upon self-regulatory strategies. In contrast, EDN-consistent caregiving did predict Social Thriving. Theorized effects of EDN-consistent care relating to the establishment of healthy, robust physiological systems controlling self-regulatory behaviors that comprise elements of Moral Socialization were not found in this sample. Although empathy was significantly correlated with EDNPR, concern after wrongdoing and internalized conduct were not, and in the models, EDNPR did not outweigh the prediction of child gender, parent age, and education for Moral Socialization. These findings suggest that the benefits of the caregiving practices addressed in the EDNPR may vary by culture.

Some of the survey items may have been interpreted differently by Swiss parents due to cultural norms. For example, the term "misbehavior" in English was translated as "bad behavior." Three participants explicitly complained about the use of the term "bad" in describing young children's behavior. Two argued that "bad" was abstract and might describe various kinds of behavior and added that "bad behavior" was seen from the adult's point of view, not the child's. The third argued that "bad" had a negative connotation, but that a child's exploration of boundaries and of his or her own sense of self was something he or she could not see as negative or bad. These statements express an attitude of critical reflection and a hesitation to negatively label behavior not desirable from an adult point of view. The latter might blur the distinction between good, appropriate, and bad and inappropriate behavior and have influenced other responses. Parents' understanding of the core concepts of the EDN and the scales included in Moral Socialization, Social Thriving and Social Maladaptation should be explored in more depth to delineate cultural differences.

The Swiss sample was significantly smaller than the U.S. sample. In addition, almost two thirds of the sample had an income higher than average, comparable with 20% of the U.S. sample. Even so, the United States and Switzerland share similarities as Western nations. The inconsistencies in results between these two countries suggested that relationships between the EDNPR and sociomoral development might be significantly different if tested in a third, more diverse, culture. Consequently, Study 3 was conducted using a sample from China.

Study 3

Method

Participants and procedure. Parents of 382 children (188 boys, 191 girls, three nonresponse) from six preschools in Beijing, China, participated. Parental age ranged from 21 to 45 years ($M_{mothers}$ = 33.49; $M_{fathers}$ = 34.07). Children ranged in age from 3 to 5 years. Education levels were no formal education (0.5%), technical secondary school (7.3%), high school (5.8%), associate's degree (17.8%), bachelor's degree (33.8%), master's degree or doctorate (30.3%), other

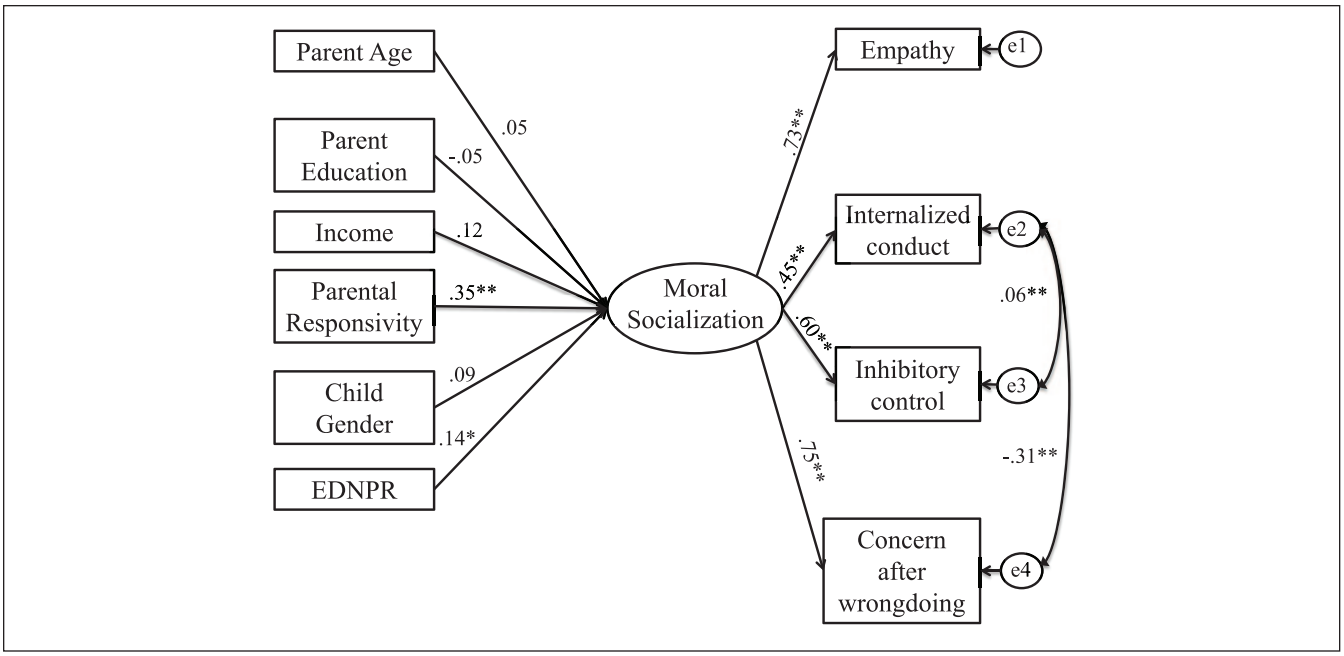

Figure 7. China Moral Socialization predicted by EDNPR and covariates.
Note. Standardized solutions. Robust $\chi^2(23) = 42.67$, $p = .006$; CFI = .94; RMSEA = .05, 90% CI RMSEA = [.03, .07]. EDNPR = Evolved Developmental Niche Provision Report; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval.
*$p < .05$. **$p < .01$.

certificate (0.8%), and missing (3.7%). Annual household income (converted to American dollars) was distributed: less than US$15,000 (2.4%), US$15,000 to US$45,000 (7.5%), US$45,000 to US$80,000 (13.1%), US$80,000 to US$120,000 (17.7%), US$120,000 to US$160,000 (17.7%), and more than US$160,000 (41.6%).

Participants received packets from their children's preschool teachers that included a cover letter explaining the study, a consent form, and the study measures. Those who returned the materials were given a book as a gift.

Measures. The same measures and composites used in Study 1 were used in this study. Native speakers of Chinese on the research team translated the materials.[2] The test–retest reliability of EDNPR was assessed based on the data of 43 mothers over a 2-week interval ($r = .75$).

Results

Means, standard deviations, and reliability coefficients are listed in the third column of Table 1 (see Supplemental Materials for correlations). As in the first two studies, we conducted SEM to examine the relationship between the EDNPR measure and the child outcomes (see Figures 7-9). The Moral Socialization measurement model was saturated when fitted to the China data. Social Maladaptation also had good fit indices, $\chi^2(3) = 2.84$, $p = .42$, CFI = 1.00, 90% CI RMSEA = [.00, .09] with the same factorial structure. Social Thriving had the same factorial structure with similarly adequate fit indices as United States, $\chi^2(6) = 20.09$, $p = .003$, CFI = .987, 90% CI RMSEA = [.04, .12]. Again, we assume cross-cultural configural measurement invariance for the child outcome variables based on good model fit of the confirmatory factor analysis (CFA) models and the exact same latent structure between countries.

We tested the relationship between EDNPR and the three outcomes using SEM, controlling for the same variables as previously. All models fit the data well (see Figures 7-9). The China data suggested that EDNPR positively predicted Moral Socialization ($b = 0.14$, $p = .02$) and Social Thriving ($b = 0.13$, $p = .03$), but did not predict Social Maladaptation ($b = –0.02$, $p = .80$).

Discussion

The measure worked well in predicting positive outcomes. The links that emerged between EDNPR and responsivity and both Moral Socialization and Social Thriving were consistent with prior research in China. In Chinese families, parental warmth was related to preschoolers' social cognition (Li & Sang, 2006), and parental responsivity was related to child empathy and sociability (Liu et al., 2010). The fact that the EDNPR predicted Moral Socialization and Social Thriving beyond responsivity suggests that other EDN-consistent components might also be important for sociomoral development.

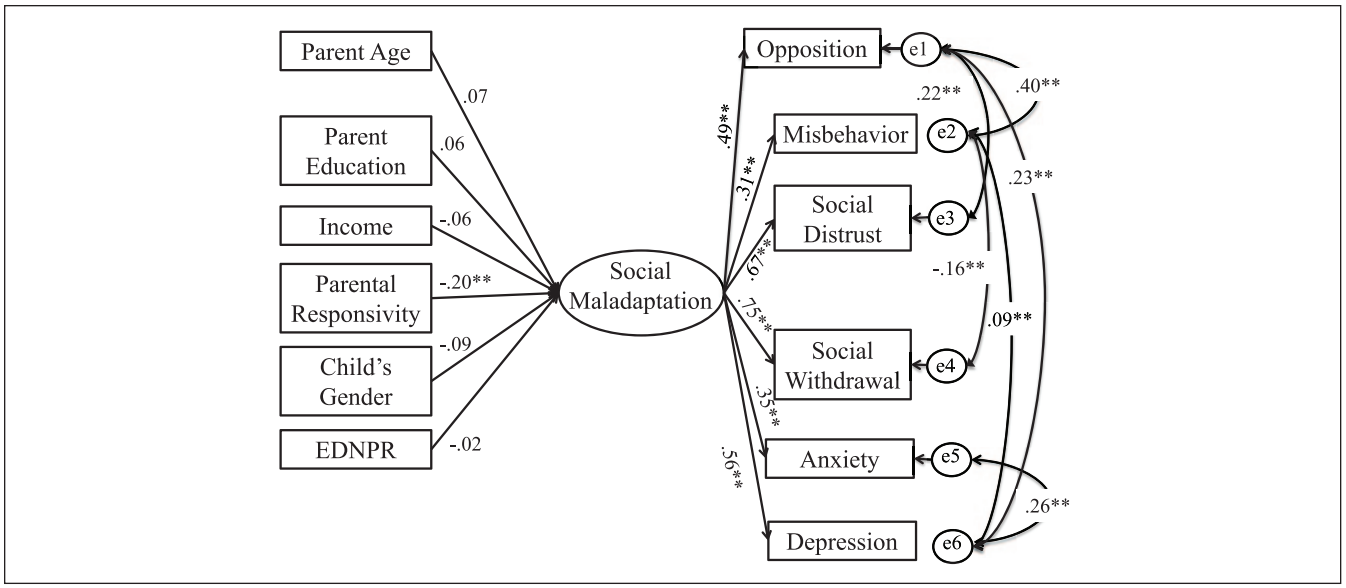

Figure 8. China Social Maladaptation predicted by EDNPR and covariates.
Note. Standardized solutions. Robust $\chi^2(44) = 54.92$, $p = .125$; CFI = .98; RMSEA = .025, 90% CI RMSEA = [.00, .04]. EDNPR = Evolved Developmental Niche Provision Report; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval. *$p < .05$. **$p < .01$.

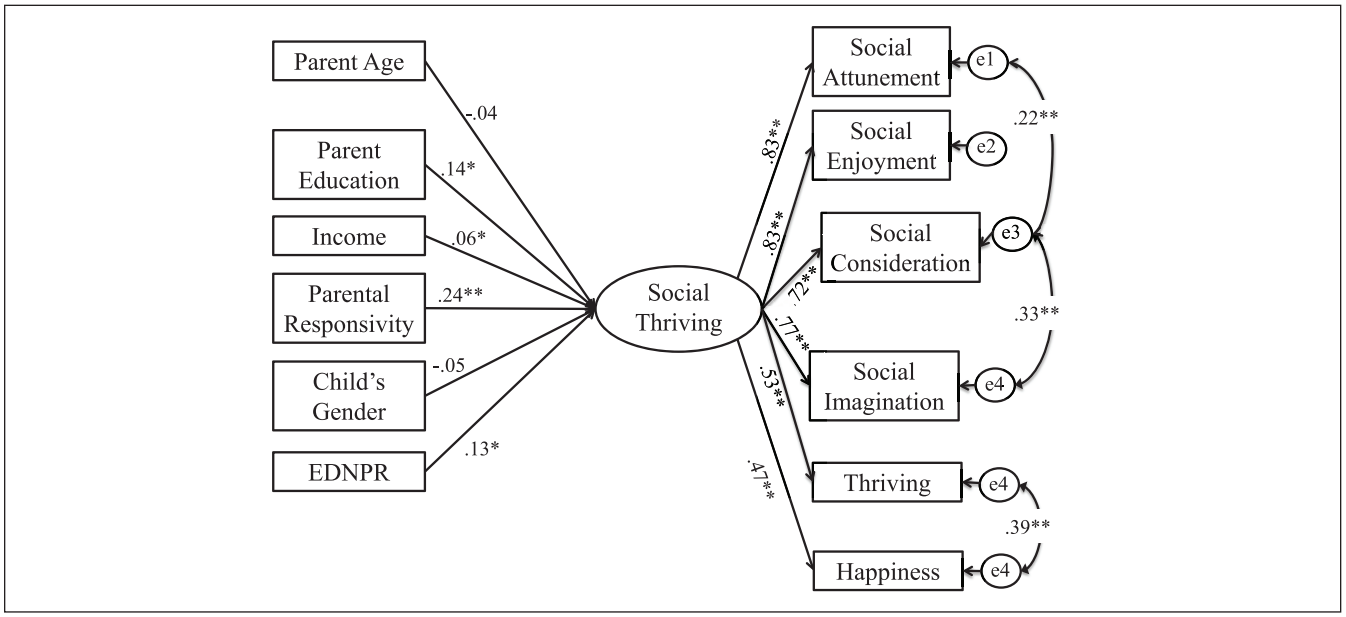

Figure 9. China Social Thriving predicted by EDNPR and covariates.
Note. Standardized solutions. Robust $\chi^2(44) = 42.67$, $p = .006$; CFI = .97; RMSEA = .045, 90% CI RMSEA = [.03, .06]. EDNPR = Evolved Developmental Niche Provision Report; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval. *$p < .05$. **$p < .01$.

For Social Thriving, EDNPR was predictive along with responsivity, but parental education and income also predicted Social Thriving. Again, this enjoyment of others appears to be partly a function of those parenting practices thought to be characteristic of the EDN over and above mothers' responsiveness to their children. Higher SES might also facilitate mothers' perceptions of their children as happy, thriving, and attuned to others if their lives are less stressful than those of their lower SES counterparts.

Social Maladaptation was predicted only by responsivity. One interpretation of these findings is related to the collectivistic and communal orientation of Chinese culture in

comparison particularly with U.S. culture. This difference relates to a system of values and self-construal in which Chinese citizens are less likely to focus on individual emotions or to centralize them in their lives (Ryder et al., 2008). Some collectivist cultures, like traditional Chinese culture, discourage expression of negative emotion (Triandis, McCusker, & Hui, 1990). Similarly, cultural rules about behavior might disallow showing opposition, distrust, or withdrawal. For example, in cross-cultural studies of psychopathology, a widely acknowledged key finding is that Chinese individuals are more likely to exhibit somatic symptoms rather than psychological symptoms of depression (Ryder, Yang, & Heine, 2002). Moreover, it is well documented that the Chinese stigmatize mental illnesses (Ryder et al., 2008). These cultural factors might have influenced mothers' responses to the variables relating to psychopathology and misbehavior in particular. However, such an explanation does not account for the fact that parental responsivity was negatively associated with Social Maladaptation, as in both of the other samples. This issue could be explored in future studies that explicitly address cultural differences.

General Discussion

We were interested in testing and validating a brief measure of recent experience (as a proxy for ongoing experience) consistent with the EDN. Theoretically, measuring the provision of the EDN is an indicator of early life experience that is species-typical. By examining the relation between EDN provision and sociomoral development in three cultures, we hoped to illuminate the extent to which this short measure of EDN-consistent care was predictive of positive child outcomes and to examine its construct validity. Generally, the ENDPR scores were significantly related to positive child outcomes even after controlling for parental responsivity and other demographic variables, except for Swiss Moral Socialization, which could be due to its very small sample size. Therefore construct validity of EDNPR is largely supported across two countries (United States, China), with methodological issues making validity in Switzerland unverifiable.

EDN Provision Related to Moral Socialization

For Moral Socialization, EDNPR scores and responsivity were predictors in the United States and China, but neither predicted Moral Socialization in the Swiss model. This latter finding is puzzling, given that responsive care facilitates development of multiple physiological systems underlying self-regulatory capacities such as the stress response (Lupien, McEwen, Gunnar, & Heim, 2009). The effects of EDNPR on Moral Socialization were also small in the U.S. and China samples. These estimates suggest that the elements of EDN-consistent care that we measured in the EDNPR have significant but modest influence on children's Moral Socialization, at least in comparison with responsivity. The fact that gender was also predictive of Moral Socialization in the U.S. and Swiss samples but not in the Chinese sample raises the question of whether parents manifest gender differences in their expectations for processes such as self-regulation and empathy in these Western cultures but not in China.

EDN Provision Related to Social Thriving

The fact that EDNPR scores predicted Social Thriving beyond responsivity alone in all three samples is consistent with work in anthropology, in that societies that provide EDN-consistent care (nomadic foragers) are also described as socially thriving (Hewlett & Lamb, 2005; Konner, 2005). The co-occurrence of EDN provision and Social Thriving is also evident in accounts of contemporary hunter-gatherer groups (Narvaez, Valentino, Fuentes, McKenna, & Gray, 2014). In these contexts, "children are not 'parented' or 'reared' so much as supported as they actively develop as individuals within the community" (Gleason & Narvaez, 2014, p. 339). The mechanisms by which practices such as touch, play, and family togetherness influence developmental outcomes cannot be determined by our data, but the findings suggest that EDN-consistent care might be characteristic of a social context in which children grow up to take pleasure in their interactions with others.

In contrast to the important constructs of resilience and adaptation, social thriving is not typically examined in developmental research. Examination of EDN-consistent care might provide clues as to how to optimize development (Narvaez & Gleason, 2013), at least with respect to social engagement within communities. However, Social Thriving, or pleasure in interactions with others, might by necessity precede what Darwin (1871/1981) described as humanity's moral sense—a connection to others that elicits, reinforces, and supports moral behavior. Darwin emphasized social pleasure, which includes capacities for *being-with* others (e.g., being emotionally present, instead of caught up in competition or fear). Our measure of Social Thriving resonates with this idea, as well as with Aristotle's claim that social-fittedness reflects flexible relational attunement (Narvaez, 2016). Nevertheless, both Darwin and Aristotle noted that those who display virtuous character also exercise self-regulation (Nussbaum, 1988) and self-control, as included our Moral Socialization variable.

EDN Provision Related to Social Maladaptation

We explored whether EDNPR would be predictive of negative child outcomes. It was negatively predictive of Social Maladaptation only in the United States, although responsivity was predictive in every model. This finding suggests that the EDNPR may not be as useful for predicting negative as for predicting positive outcomes. In other words, absence of EDN-consistent care, at least the elements measured by the

EDNPR, is not typically detrimental to average trouble-free development (except perhaps in the United States). One way to conceptualize the role of these caregiving practices is by providing the difference between healthy, adequate care and care that facilitates Social Thriving and perhaps some promotion of sociomoral development. Again, this interpretation supports the idea that caregiving practices consistent with the EDN might help optimize development, even as the adaptability of the human species might mean that missing these EDN-consistent components does not compromise average development.

Parental Responsivity

As expected, parental responsivity was predictive in nearly every model. These findings are consistent with a plethora of research connecting parent responsivity to children's developmental outcomes. When relationships between scores on the EDNPR and the outcome variables were significant, they were in the same direction as responsivity, which could be interpreted as providing modest concurrent validity of the EDNPR measure.

In summary, the EDNPR allowed for the assessment of children's experience beyond parental responsivity alone. The findings suggest that measuring the EDN proximally might be beneficial for predicting children's positive outcomes, at least in relation to Social Thriving and to some extent Moral Socialization. While research on children's resilience has provided an optimistic story regarding our species' adaptability, consideration of the contexts and practices that promote not just healthy adaptation, but actual Social Thriving, is a worthy goal. The results presented here are promising for a short measure of the EDN, although further attention must be paid to the different ways in which culture might influence these processes. Finally, the inconsistency in the predictive power of the other control variables raises interesting questions about how demographic characteristics such as child gender, parental age, income, and education might influence developmental outcomes.

Limitations

This study has several limitations. Theoretically, we measured features of humanity's purported EDN but only within industrialized societies. Ideally, the comparison of EDN-related experience would involve indigenous cultures and possibly cross-species (mammals) comparisons. There were methodological weaknesses as well. First, all data were obtained through parental report. Correlations that emerged could be owing to the common source of information. Future studies should use observation to corroborate both EDN provision (what children are experiencing) and child outcomes. Second, the methodological differences, small sample size, and the lower reliability of the EDNPR measure in the Swiss data might have attenuated the effects on developmental outcomes.

Future Directions

A short parenting report like the EDNPR allows for longitudinal data collection to measure the flux in experience. The findings presented here suggest that the EDNPR might allow for analysis of the concurrent and predictive relations between EDN-consistent experience and reports of child outcomes. In-depth analysis of family dynamics through observation would also be helpful for interpretation and might help illuminate ways in which parenting practices promote developmental optimization specifically in relation to children's social engagement.

The correspondence in the directions of effects between the EDNPR and parental responsivity for some developmental outcomes raises the question of whether and how EDN-consistent parenting might be related to attachment. Because secure attachment has been related to higher Moral Socialization and lower Social Maladaptation (Sroufe et al., 2005), attachment security could be examined for its relation to experiences measured by the EDNPR. Attachment security is consistently correlated with parental responsiveness, relating to greater social skills and emotional and behavioral self-regulation longitudinally (Allen & Fonagy, 2002; Fonagy, Steele, Moran, Steele, & Higgitt, 1991; Kochanska, 2002; Sroufe et al., 2005).

Trevarthen (2005) provides an interesting framework for how attachment and EDN-consistent parenting might be related. He suggests that typical measures of attachment, based on Bowlby's definition of warmth attachment (which includes soothability and deactivation of defensive emotions and behaviors), are not measuring optimal attachment. Instead, optimal attachment, which Trevarthen calls companionship attachment, involves togetherness in play, intention, interests, and affective appraisals—behaviors reminiscent of EDN-consistent caregiving. Care that fosters companionship attachment might reflect the evolved nest as provided in hunter-gatherer groups described by anthropologists (Hewlett & Lamb, 2005). Perhaps responsivity fosters warmth attachment, whereas other EDN-consistent practices promote companionship attachment. Theoretically, the measure of Social Thriving presented here might be an indicator of this form of optimal attachment. Examination of this possibility might illuminate the study of developmental optimization.

Declaration of Conflicting Interests

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. For this measure, we cut down the number of items from 29 to 14, considering item content as well as statistical information, and achieved similar reliability.
2. The response scale for the Evolved Developmental Niche Provision Report was translated conceptually rather than literally because of cultural preferences.

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